(Pages : 2) **6677**

Reg. No. : .....

Name : .....

Fifth Semester B.Tech. Degree Examination, November 2013
(2008 Scheme)
Branch : Information Technology
08.503 : THEORY OF COMPUTATION

Time : 3 Hours Max. Marks : 100

PART – A

Each question carries **4** marks.

1. Are DCFLs closed under complementation. Why ?
2. What are meant by useless symbols in a CFG ? How are they removed ?
3. Give the formal definition of regular expressions.
4. Is $L^R = \{x/x^R$ is in L} regular ? Why ? (Assume L is regular).
5. What is meant by Church-Turing thesis ?
6. Show that partial recursive functions computed by Turing Machines are analogous to recursively enumerable languages.
7. What are Moore and Mealy machines ?
8. How does Myhill-Nerode theorem help in minimizing DFA ?
9. $L_1 = \{a^n b^n/n > 0\}$ and $L_2 = \{a^n b^{2n}/n > 0\}$.

   Is $L_1 \cup L_2$ a DCFL ? Why ?
10. What is a Universal Turing Machine ?

(10×4=40 Marks)

P.T.O.

PART – B

Each question carries **20** marks.

11. a) Show that for every regular expression r, there exist an NFA with $\in$-transitions which accept L (r). **10**

    b) Design a Moore machine which outputs N mod 5 where N is a binary number given as input. **10**

OR

12. Show that there exist an algorithm to determine whether two DFAs accept the same language. Give proof for each step of the algorithm. **20**

13. a) State and prove the pumping lemma for CFLs. **10**

    b) Given $L_2 = \{a^n b^m a^n / m > 0, n > 0\}$

    Is L_2 a CFL ? If so, design a PDA which accepts L_2 otherwise, using pumping lemma, prove that L_2 is not a CFL. **10**

OR

14. Show that for every CFL, there is an equivalent PDA. **20**

15. Design a Turing machine which accepts $L = \{a^n b^n c^n / n > 0\}$. **20**

OR

16. a) Show that the Universal Language is recursively enumerable. **12**

    b) What is meant by decidable and undecidable problems ? Explain. **8**

(3×20=60 Marks)